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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/992,642	11/13/2001	Stefan M. Freudenberger	10011515-1	6278

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EXAMINER	
SHRADER, LAWRENCE J	
ART UNIT	**PAPER NUMBER**
2193	

DATE MAILED: 06/16/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/992,642	FREUDENBERGER ET AL.	
	Examiner	Art Unit	
	Lawrence Shrader	2193	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 March 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 3-27 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 3-27 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. This Office Action is in response to the amendment filed on 3/01/2005.

2. The Applicant's arguments have been fully considered, but are moot in view new grounds of rejection.

3. Claims 3 – 27 remain rejected, and claims 1 and 2 have been cancelled as requested by the Applicant.

Oath/Declaration

4. The new oath/declaration is acknowledged and accepted.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 3, 5 – 9, 11; and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Buzbee, U.S. Patent 6,219,832 in view of Schreiber et al., U.S. Patent 6,438,747 (hereinafter referred to as Schreiber).

In regard to claim 3:

> *"generating annotation information about said computer program, said annotation information being derived from information held by a compiler about references to individual memory locations;*
>
> *storing said annotation information with said computer program, said annotation information enabling a dynamic optimizer to optimize said computer program during execution."*

See Buzbee Figure 1, and column 4, lines 41 – 50 teaching all, except annotation information derived from references to memory locations. However, Schreiber discloses an annotation file used assign memory addresses in a compiling process (column 24, lines 27 – 54). Therefore, it would have been obvious to one skilled in the art at the time the invention was made to combine the generation and storage of annotation information as taught by Buzbee with the annotation information derived from memory locations as taught by Schreiber because it is well known in the art that annotations are derived from many different types of information that are useful in an optimization function, and memory location information is useful for assigning memory addresses to variables in local memory as taught by Schreiber at column 24, lines 39 – 46.

In regard to claim 5, incorporating the rejection of claim 3:

> *"...wherein generating annotation information comprises a compiler generating said annotation information."*
>
> See Buzbee, e.g., Figure 1.

In regard to claim 6, incorporating the rejection of claim 3:

> *"...wherein said computer program comprises at least one executable file."*
>
> Buzbee discloses at least one executable program at column 4, line 6.

In regard to claim 7, incorporating the rejection of claim 3:

"...wherein said computer program comprises least one source file."

See Buzbee at column 4, lines 41 – 44.

In regard to claim 8, incorporating the rejection of claim 3:

"...wherein said generating annotation information comprises generating annotation information derived from runtime architecture and software conventions."

See Buzbee column 4, lines 41 – 50 and the Abstract.

In regard to claim 9, incorporating the rejection of claim 3:

"...wherein said computer program is compiled by a compiler, and wherein said generating annotation information comprises generating annotation information derived from information held by said compiler about references to individual memory locations."

Buzbee discloses compiler adds annotations regarding entry points, which inherently corresponds to a memory location (column 4, lines 41 – 50).

In regard to claim 11, incorporating the rejection of claim 3:

"...wherein said generating annotation information comprises generating annotation information comprising a list of non-ambiguous memory locations."

Buzbee discloses compiler adds annotations regarding entry points, which inherently corresponds to a specific memory location (column 4, lines 41 – 50).

In regard to claim 26:

"one or more computer readable storage media;

computer executable instructions stored in the one or more computer readable storage media, the computer executable instructions comprising:

instructions for generating annotation information about said computer program, wherein said annotation information enables a dynamic optimizer to optimize said computer program during execution, said annotation information being derived from information held by a compiler about references to individual memory locations;

instructions for storing said annotation information with said computer program."

See Buzbee Figures 1 and 3; column 4, lines 3 – 6, and column 4, lines 41 – 50 teaching all, except annotation information derived from references to memory locations. However, Schreiber discloses an annotation file used assign memory addresses in a compiling process (column 24, lines 27 – 54). Therefore, it would have been obvious to one skilled in the art at the time the invention was made to combine the generation and storage of annotation information as taught by Buzbee with the annotation information derived from memory locations as taught by Schreiber because it is well known in the art that annotations are derived from many different types of information that are useful in an optimization function, and memory location information is useful for assigning memory addresses to variables in local memory as taught by Schreiber at column 24, lines 39 – 46.

7. Claims 18; and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Buzbee, U.S. Patent 6,219,832 in view of Radigan, U.S. Patent 6,738,967.

In regard to claim 18:

"reading annotation information derived from runtime architectures and software conventions used to compile said computer program, said annotation information being stored with said computer program;

dynamically optimizing said computer program based on said annotation information while said computer program is being executed."

See Buzbee Figure 1, and column 4, lines 41 – 50 teaching all, except annotation information derived from references to memory locations. However, Radigan discloses an annotation information derived from architecture and software conventions (Abstract; column 3, lines 26 – 33). Therefore, it would have been obvious to one skilled in the art at the time the invention was made to combine the generation and storage of annotation information as taught by Buzbee with the annotation information derived from memory locations as taught by Radigan because it is well known in the art that annotations are derived from many different types of information that are useful in an optimization function, and architecture and software conventions are useful compiling multiple virtual machines targeting different processor architectures as taught by Radigan in the Abstract.

In regard to claim 27:

"one or more computer readable storage media;

computer executable instructions stored in the one or more computer readable storage media, the computer executable instructions comprising:

instructions for reading annotation information derived from runtime architectures and software conventions used to compile said computer program, said annotation information being stored with said computer program;

instructions for dynamically optimizing said computer program based on said annotation while said computer program is being executed."

See Buzbee Figures 1 and 3; column 4, lines 3 – 6, and column 4, lines 41 – 50 teaching all, except annotation information derived from references to memory locations. However, Radigan discloses an annotation information derived from architecture and software conventions (Abstract; column 3, lines 26 – 33). Therefore, it would have been obvious to one skilled in the art at the time the invention was made to combine the generation and storage of annotation information as taught by Buzbee with the annotation information derived from memory locations as taught by Radigan because it is well known in the art that annotations are derived from many different types of information that are useful in an optimization function, and architecture and software conventions are useful compiling multiple virtual machines targeting different processor architectures as taught by Radigan in the Abstract.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Buzbee, U.S. Patent 6,219,832 in view of Schreiber et al., U.S. Patent 6,438,747, and further in view of Porter, U.S. Patent 6,357,040.

In regard to claim 4, incorporating the rejection of claim 3:

> *"...wherein generating annotation information comprises generating annotation information enabling replacement of subroutine calls with inline program code in said computer program while said computer program is being executed."*

Buzbee discloses a dynamic optimizer, but neither Buzbee nor Schreiber explicitly discloses replacing subroutine calls with inline code. However, Porter discloses an optimizer that replaces a function call with inline code. Therefore, it would have been obvious to one skilled in the art at the time the invention was made to modify the dynamic optimizer of Buzbee with the in-lining feature of the optimizer taught by Porter in order to reduce overhead in the optimized code as suggested by Porter at column 5, lines 43 – 46, and which is well known in the art.

10. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Buzbee, U.S. Patent 6,219,832 in view of Radigan, U.S. Patent 6,738,967, and further in view of Porter, U.S. Patent 6,357,040.

In regard to claim 20, incorporating the rejection of claim 18:

> *"...wherein said dynamically optimizing said computer program comprises replacing subroutine calls in said computer program with inline program code."*

Buzbee discloses a dynamic optimizer, but neither Buzbee nor Radigan explicitly discloses replacing subroutine calls with inline code. However, Porter discloses an optimizer that replaces a function call with inline code. Therefore, it would have been obvious to one skilled in the art at the time the invention was made to modify the dynamic optimizer of Buzbee with the in-lining feature of the optimizer taught by Porter in order to reduce overhead in the

optimized code as suggested by Porter at column 5, lines 43 – 46, and which is well known in the art.

11. Claims 10, and 12 – 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Buzbee, U.S. Patent 6,219,832 in view of Schreiber et al., U.S. Patent 6,438,747, and further in view of Blaise et al., U.S. Patent 6,505,344 (hereinafter referred to as Blaise).

In regard to claim 13, incorporating the rejection of claim 11:

"...wherein said non-ambiguous memory locations comprise stack frame locations."

Buzbee discloses dynamic optimization wherein the annotations are stored that indicate the number of parameters an entry point in the program expected by a handler (column 2, lines 39 – 47), but neither Buzbee nor Schreiber explicitly discloses stack frame location information. However, Blaise discloses inline stack locations as an annotation (column 9, lines 1 – 29). Therefore, it would have been obvious to one skilled in the art at the time the invention was made to combine the dynamic optimization system using annotations as taught by Buzbee with the annotation of a stack frame as taught by Blaise because the annotation provides analysis information to be used during execution as taught by Blaise at column 9, lines 15 – 20.

In regard to claims 10, 12, and 14 – 17:

In regard to claim 10, incorporating the rejection of claim 3:

"...wherein said generating annotation information comprises generating annotation information identifying a unique stack pointer register to be used by said computer program."

In regard to claim 12, incorporating the rejection of claim 11:

> *"...wherein said annotation information enables said dynamic optimizer to obtain canonical names for said non-ambiguous memory locations."*

In regard to claim 14, incorporating the rejection of claim 3:

> *"...wherein said generating annotation information comprises generating annotation information comprising a mapping of memory references to all non-ambiguous locations which are referenced."*

In regard to claim 15, incorporating the rejection of claim 3:

> *"...wherein said generating annotation information comprises generating annotation information comprising a list of canonical names of stack frame locations that are promotable."*

In regard to claim 16, incorporating the rejection of claim 3:

> *"...wherein said generating annotation information comprises generating annotation information comprising a guarantee that no stack frame location is live beyond the scope of the stack frame."*

In regard to claim 17, incorporating the rejection of claim 3:

> *"...wherein said generating annotation information comprises generating annotation information comprising a format and a location of stack unwinding information."*

They are rejected for the same reason put forth in the rejection of claim 13. Buzbee discloses dynamic optimization wherein the annotations are stored that indicate the number of parameters an entry point in the program expected by a handler (column 2, lines 39 – 47), but neither Buzbee nor Schreiber explicitly discloses stack frame location information. However, Blaise discloses inline stack locations as an annotation (column 9, lines 1 – 29). Claims 10, 12, and 14 – 17 contain variations of different species of information mapped by the annotations. Therefore, it would have been obvious to one skilled in the art at the time the invention was made to combine the dynamic optimization system using annotations as taught by Buzbee with

the annotation of a stack frame as taught by Blaise, or an annotation comprising other types of useful functional information, because one would be motivated to use the annotation to provide analysis information used during execution as taught by Blaise at column 9, lines 15 – 20.

12. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Buzbee, U.S. Patent 6,219,832 in view of Radigan, U.S. Patent 6,738,967, and further in view Bugnion, U.S. Patent 6,704,925.

In regard to claim 19, incorporating the rejection of claim 18:

> *"...wherein said dynamically optimizing said computer program comprises a binary translator optimizing said computer program."*

Buzbee discloses a dynamic translating system optimizer (see Abstract), but neither Buzbee nor Radigan explicitly discloses a binary translator. However, Bugnion discloses a binary translator. Therefore, it would have been obvious to one skilled in the art at the time the invention was made to modify the dynamic optimizer of Buzbee with the binary translator taught by Bugnion because binary translation is more efficient by eliminating overhead in software interpretation as taught by Bugnion at column 2, lines 42 – 43.

13. Claims 21 – 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Buzbee, U.S. Patent 6,219,832 in view of Ng, U.S. Patent 6,704,314.

In regard to claim 21, incorporating the rejection of claim 18:

> *"...wherein said dynamically optimizing said computer program comprises removing redundant callee-save register restores."*

Buzbee discloses dynamic optimization (column 2, lines 39 – 47), but neither Buzbee nor Radigan explicitly discloses removing redundant callee-save register stores. However, Ng discloses optimization to remove redundant expressions (column 1, lines 40 – 65). It is well known in the art that the purpose of optimization is to analyze code and produce more efficient instruction sequences to increase performance. Therefore, it would have been obvious to one skilled in the art at the time the invention was made to combine the dynamic optimization system as taught by Buzbee with the removal of redundant expressions as taught by Ng because the analysis information and restructuring of instructions improves performance.

In regard to claims 22 – 25:

They are rejected for the same reason put forth in the rejection of claim 21. Buzbee discloses dynamic optimization (column 2, lines 39 – 47), but neither Buzbee nor Radigan explicitly discloses removing redundant callee-save register stores. However, Ng discloses optimization to remove redundant expressions (column 1, lines 40 – 65). It is well known in the art that the purpose of optimization is to analyze code and produce more efficient instruction sequences to increase performance. Claims 10, 12, and 14 – 17 contain variations of different species of information obtained by analysis and adjusting the code to improve performance. Therefore, it would have been obvious to one skilled in the art at the time the invention was made to combine the dynamic optimization system as taught by Buzbee with the removal of redundant expressions as taught by Ng because the analysis information and restructuring of instructions improves performance.

In regard to claim 22, incorporating the rejection of claim 18:

> *"...wherein dynamically optimizing said computer program comprises propagating constant arguments within said computer program."*

In regard to claim 23, incorporating the rejection of claim 18:

> *"...wherein said dynamically optimizing said computer program comprises promoting local data from a stack frame location to a register."*

In regard to claim 24, incorporating the rejection of claim 18:

> *"...wherein said dynamically optimizing said computer program comprises removing redundant callee register saves."*

In regard to claim 25, incorporating the rejection of claim 18:

> *"...wherein said dynamically optimizing said computer program comprises removing stack frame allocation."*

Conclusion

14. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37

CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lawrence Shrader whose telephone number is (571) 272-3734. The examiner can normally be reached on M-F 08:00-16:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kakali Chaki can be reached on (571) 272-3719. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Lawrence Shrader
Examiner
Art Unit 2193

8 June 2005

Kakali Chaki

KAKALI CHAKI
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